NOTE PAD

Fi ld of th Inv ntion

The invention relates to a note-pad comprising a plurality of sheets of paper and a base sheet of essentially identical size, each of said plurality of sheets of paper and the base sheet being releasably adhered to each other, the top face of each of said plurality of sheets of paper being writeable and the note-pad comprising means for restraining its lateral movement relative to the underlying supporting surface.

Background of the Invention

Note-pads comprising a plurality of sheets of paper and a base sheet which are available in rectangular, square or a variety of other formats, are common for office and private use. The plurality of sheets of paper and the base sheet can be releasably adhered to each other by applying an adhesive such as, for example, a hot-melt adhesive tape strip to part of the edge of the note-pad. An individual sheet of paper can be released from the note-pad by peeling the top sheet of paper from the note-pad thereby separating the bond between the glued edge portions of the topmost sheet and the subsequent sheets. In this type of note-pad which will be termed below and above as “edge-glued” type note-pad the individual sheet of paper when separated from the note-pad is essentially free of adhesive.

In another type of note-pad the bottom face of each sheet of paper is usually partly covered with a layer of a releasable pressure-sensitive adhesive which forms a bond to the top face of the subjacent sheet of paper in the note-pad. When peeling the top sheet of paper from the subjacent sheet of paper in the note-pad, the releasable pressure-sensitive adhesive layer essentially sticks to the bottom face of the top sheet and is removed with such top sheet. The pressure-sensitive adhesive usually is repositionable so that the individual sheet of paper when separated from

the note-pad can be used as a stick-on note. This type of note-pad will be termed below and above as "stick-on" type note-pad.

Irrespective of the specific construction of the note-pads, these are frequently used, for example, to take notes during a phone conversation when one hand is required to hold the phone receiver while the other hand holds the pen. In this or in other situations where the hand not holding the pen happens not to be free or when the size of the note-pad is so small that it is difficult to fix it with one hand while taking a note with the other hand, it is disadvantageous that the note-pad tends to laterally move or slide across the underlying desk or another supporting surface thereby rendering it difficult to write on the top sheet of the note-pad.

In case of "stick-on" note-pads which are commercially available from Minnesota Mining and Manufacturing Company, St. Paul, MN, U. S. A., as Post-it® Notes note-pads and comprise a plurality of individual sheets of paper each bearing on usually part of its base surface a repositionable adhesive layer, this problem can be addressed by separating the top sheet of paper from the note-pad first, then applying it to a suitable smooth surface such as a document and then taking the note. This procedure is, however, not straightforward, cannot be applied to purely "edge-glued" note-pads and requires the presence of a smooth and sufficiently rigid surface suitable for writing upon.

In case of "stick-on" note-pads the lateral movement of the note-pad can be avoided by removing the base sheet thereby exposing the releasable adhesive layer on the bottom sheet of paper. This procedure is disadvantageous for several reasons. The exposed adhesive layer accumulates dust and dirt resulting in an aesthetically unpleasant appearance of the bottom surface of the note-pad. Once the adhesive layer on the base surface of the bottom sheet of paper is contaminated it has to be replaced with the next-to-bottom sheet, i.e. part of the pad has to be discarded. Also, this technique of avoiding lateral movements of the note-pad is not applicable to "edge-glued" note-pads.

GB 2,319,213 suggests using of large desk-top note-pads to avoid the problem of lateral moving or sliding of the note-pad. The large-size note-pad of GB '213 typically is of A2 paper size and comprises a multiplicity of sheets of paper each divided into detachable sub-areas or padletts by horizontal and vertical rows, respectively, of perforations. It is disclosed that the frictional stability which stems from the large surface area of the desk-top note-pad of GB '213 can be supported by using a thicker material having a high coefficient of friction as backsheet. Due to its large size the note-pad of GB '213 can only be used as desktop note-pad. When using note-pads according to GB '213 of the purely edge-glued type fixing of the top sheet of paper decreases with increasing the number of padletts removed from such top sheet. Due to its high frictional stability moving of the desktop note-pad of GB '213 on a support surface while not writing on it, is difficult or not possible, respectively. For displacement the desk-top note-pad of GB '213 has to be lifted and carried to its new place. Contrary to this it is highly desirable, in particular, for small size note-pads that these can be easily moved, e.g., on a desk while not writing on them whereas lateral movement or sliding is effectively suppressed when pressure is exerted upon them by means of a writing instrument.

US 3,937,491 addresses this problem by disclosing a non-skid releasable paper note-pad having a pad support member made from a slippery, low-friction material and formed about the periphery of the sheet member as a marginal support. The note-pad of US '491 also comprises a base sheet of a resilient deformable material having a high coefficient of friction such as sponge rubber. When a note is taken on the note-pad of US '491 the material in the centre of the pad is deformed and contacts the supporting surface of the note-pad thereby immobilizing the pad with respect to lateral sliding. When the writing instrument is removed the resilient, deformable base sheet returns to its original shape and the note-pad can easily be slid laterally due to the presence of the slippery, low-friction frame. The construction disclosed in US '491 is, however, relatively complicated and requires the presence of a thick resilient, deformable layer

and a slidable frame. A similar writing pad holder is disclosed in GB 2,204,830.

US 5,405,168 discloses a combination computer mouse pad and note-pad for providing a work surface which allows for both taking notes and moving of a computer mouse. The note-pad comprises a plurality of sheets of paper which are, optionally, secured to a base preferably fabricated of hard chip board. Such base is, however, relatively thick and also impedes lateral sliding of the note-pad when no note is taken. US 5,876,010 discloses another combination of computer mouse pad and writing pad which has a base comprising a chip board layer and a non-slip, tacky surface thereby allowing a user to make notes on the note-pad and to easily tear off the respective sheet of paper without moving the pad or tearing the sheet being removed.

US 5, 232,247 discloses a writing surface assistance assembly for use by disabled people. The surface of the assembly comprises an exposed substantially smooth adhesive layer onto which single sheets of paper can be placed. The adhesive surface releasably secures the sheet of paper and prevents it from sliding laterally without damaging it. Although the assembly of US 5, 232,247 could be used in conjunction with note-pads, it has a relatively complicated construction and is not easy to handle so that it does not meet basic requirements of common office and private use of note-pads.

FR 2,733,183 discloses a reusable base for a notelet block comprising a lower layer of a cellular foam material, an upper layer providing a smooth surface and a U-section clip for holding the notelet block. The lower layer of cellular foam material exhibits a non-slippery base surface to prevent lateral sliding of the assembly of FR '183. The construction disclosed in FR '183 is relatively complicated and is not suitable for manufacturing of note-pads with throwaway base sheets which are easy to handle and most common for office and private use. The construction of FR '183 also comprises a relatively thick lower layer of a cellular foam material which impedes lateral sliding of the note-pad.

GB 2,000,959 discloses a support tray for supporting a telephone and a note-pad. The exposed surface of the tray comprises a fibrous coating which mechanically engages with a fibrous coating on the exposed surface of the base of the note-pad relative to the tray. The practical suitability of the note-pad of GB '959 is, however, limited because it requires the presence of a supporting surface which is capable to engage with the fibrous coating on the base layer of the note-pad.

Although the problem of imparting skid-resistance to note-pads while a note is taken, has been discussed extensively in prior art, the solutions to this problem provided so far do not meet all practical requirements to a sufficient extent. In particular, the prior art solutions are characterized by a limited practical applicability, by a difficult or inconvenient handleability, by a complicated construction and/or by other shortcomings.

It was therefore an object of the present invention to provide a note-pad which is skid-resistant while a note is taken, and does not exhibit the shortcomings of the prior art note-pads or exhibits such shortcomings to a lower degree only, respectively. More specifically, it was an object of the present invention to provide a note-pad which

- exhibits when a note is taken, skid-resistance properties so that lateral sliding of the note-pad is impeded during writing,
- can be easily moved across the surface supporting the note-pad when no pressure is exerted onto the note-pad by, for example, a writing instrument,
- is easy to handle, and
- exhibits a simple construction comprising no components which are designed for being re-used.

Other objects of the present invention can be taken from the following detailed description of the invention.

Bri f Description of th Inv ntion

The present invention relates to a note-pad comprising a plurality of sheets of paper and a base sheet, each of said plurality of sheets of paper and the base sheet having a top face, a bottom face and side edges, the plurality of sheets and the base sheet being releasably adhered to each other, the top face of each of said plurality of sheets of paper being writable and the bottom face of said base sheet bearing an exposed skid-resistant layer having a thickness of less than 100 μm, a static coefficient of friction of at least 1 as measured according to DIN 53.375-B on a stainless steel surface using a static frictional weight of 200 g, and a 90° peel adhesion on a stainless steel surface of less than 0.1 N/1.27 cm as measured according to FINAT Test Method no. 2.

Brief Description of the Figures

Fig. 1 shows a partially exploded schematic perspective representation of a note-pad 1 comprising a plurality of sheets of paper including the top sheet 10, the next-to-the-top sheet 11, the bulk of sheets 15 and the base sheet 20, the top sheet 10 comprising a top face 10a, a bottom face 10b and side edges 10c, and the base sheet 20 bearing on its bottom face a skid-resistant layer 25.

Fig. 2 shows a partially exploded schematic cross-sectional view of a note-pad of the "edge-glued" type comprising an adhesive 30 attached to part of the edge 10c, 11c, 15c, 20c, 25c of the note-pad 1.

Fig. 3 shows a partially exploded schematic cross-sectional view of a note-pad of the "stick-on" type comprising a releasable pressure-sensitive adhesive adhered to stripe-geometry section 31 of the base face 10b, 11b, 15b of each of the multiplicity of sheets of paper of the note-pad.

Fig. 4 shows a partially exploded schematic perspective view of a note-pad of the "stick-on" type wherein the size of the base sheet 20 bearing skid-resistant layer 25 exceeds the size of the bottom sheet of paper of the note-pad.

D tail d Description of the Inv ntion

Fig. 1 shows a schematic perspective representation of a conventional note-pad 1 of an essentially square format in a partially exploded view. The note-pad comprises a plurality of sheets of paper whereby the top sheet 10 and the next-to-the-top sheet 11 are shown in an exploded view while the rest of the plurality of sheets is represented by reference number 15. As is exemplary shown for the top sheet 10 and the next-to-the-top sheet 11, each sheet of paper has a top face 10a, 11a, a bottom face 10b, 11b and side edges 10c, 11c.

Any kind of paper can be used in the note-pads of the present invention as long as the top faces 10a, 11a, 15a of each sheet of paper are writable. The paper sheets usually exhibit essentially smooth top and bottom faces, respectively, but paper having, e.g., a textured surface can also be used for specific applications such as, for example, in the combinations computer mouse pad/note-pad disclosed in US 5,405,168 and US 5,876,010. Paper which is suitable for use in the note-pads of the present invention preferably has a thickness of between 50 µm and 200 µm and more preferably between 75 µm and 125 µm.

The note-pad shown in Fig. 1 essentially has a square format, but other formats such as, e.g., rectangular, circular, elliptical or other regular or irregular formats can also be used. An example of a specific format is disclosed, for example, in German Design Registration M 97 04 884.4 issued to 3M Company.

The individual sheets of paper of the note-pad are preferably of essentially identical size but it is also possible that the size of the individual sheets of paper is varied. In a specific embodiment the width of the sheets of paper having an essentially rectangular or square, respectively, format is increased in one or both, respectively, main directions of the note-pad thereby obtaining a note-pad with one or more wedge-shaped edges to which, for example, a printing may be applied.

The formats and geometrical extensions of the note-pads or of the paper sheets of the note-pads, respectively, explicitly mentioned above are

given by way of example only, and other formats and geometrical extensions may be used as well.

Fig. 2 shows a schematic cross-sectional view of a note-pad 1 of the "edge-glued" type where part of the side edges 10c, 11c, 15c of the sheets of paper and the part of the side edge 20c of the base sheet 20 bearing the skid-resistant layer 25 with side edge 25c, are bonded to each other by means of adhesive 30. The adhesive 30 is preferably attached to the respective part of the side-edge 10c, 11c, 15c, 20c, 25c of the note-pad 1 as an adhesive tape strip which can be cut to the dimension of the part of the side edge prior to or after its application to the note-pad. Especially preferred is the use of hot-melt adhesives which can be applied by extrusion-coating or by applying a hot-melt adhesive strip with subsequent heating.

Fig. 3 shows a schematic cross-sectional view of a note-pad 1 of the "stick-on" type where section 31 of the base face 10b, 11b, 15b of each sheet of paper which has the form of a stripe is coated with a releasable pressure-sensitive adhesive. Each individual sheet of paper is adhered via the pressure-sensitive adhesive of section 31 to the top face 11a, 15a of the subjacent sheet of paper and to the top face 20 a of the base sheet thereby forming note-pad 1. The pressure-sensitive adhesive of section 31 and the paper used for the preparation of the individual sheets of paper are selected so that the adhesion of the pressure-sensitive adhesive of section 31 to the bottom face 10b, 11b, 15b of the respective top sheets of paper is higher than to the top faces 11a, 15 of the corresponding subjacent sheets. If desired, the adhesion or anchorage, respectively, of the pressure-sensitive adhesive to the bottom face 10b, 11b, 15b of the individual sheets can be increased by applying a primer to such bottom face or the section 31 of the bottom face to which the adhesive is applied, respectively. Suitable primers include, for example, the binder materials disclosed in US 3,857,731 providing individual sockets on a substrate surface for the microspherical pressure-sensitive adhesive to be retained in. When a sheet of paper 10,11,15 is peeled away from the note-pad 1,

the pressure-sensitive adhesive of section 31 thus essentially sticks to the bottom face of such sheet and is removed with such sheet while essentially no residues of the pressure-sensitive adhesive remain adhered to the top face of the subjacent sheet of paper.

The releasable pressure-sensitive adhesive can be adhered to part or all of the bottom faces 10b, 11b, 15b of the sheet of paper. Fig. 3 which shows a cross-section of the note-pad of Fig. 1, is an example where the pressure-sensitive adhesive forms a stripe-geometry section 31 along one edge of the essentially square-formatted note-pad of Fig. 1.

The pressure-sensitive adhesives used are releasable to allow for separating of the individual sheets of paper from the note-pad. The pressure-sensitive adhesive preferably is also repositionable so that the sheet of paper when removed from the note-pad, can be attached to other surfaces. Suitable releasable and repositionable pressure-sensitive adhesives are described, for example, in US 3,691,140, US 4,166,152, US 4,495,318, US 4,598,212, US 4,786,696, US 4,810,763 and US 4,944,888. Note-pads 1 of the stick-on type are commercially available in various formats and colours as Post-it® Notes note-pads from 3M Company.

The note-pad 1 comprises a base sheet 20 which supports the note-pad 1 and bears on its bottom face 20b or on part of its bottom face 20b, respectively, an exposed skid-resistant layer 25. The two-layer sheeting comprising the base sheet 20 and the skid-resistant layer 25 will be termed below and above as backsheet of the note-pad 1.

The base sheet 20 can be identical with the bottom sheet of paper of the note-pad 1 but usually the base sheet is selected to exhibit a higher mechanical stiffness than the individual sheets of paper 10, 11, 15 of the note-pad 1. The base sheet 20 can be selected from a range of materials including paper, plastics, metal foils or laminates. Especially preferred are paper and plastic base sheets.

In case of a paper base sheet, the paper preferable exhibits a weight of between 50 g/m² and 150 g/m², more preferably of between 50

g/m^2 and 130 g/m^2 and a thickness of between 40 µm and 500 µm. The ratio of the thickness of a paper base sheet over the thickness of an individual sheet of paper 10, 11, 15 of the note-pad preferably is at least 0.8, more preferably at least 1.0 and specifically at least 1.1.

In case of a plastic base sheet the plastic material is preferably selected to exhibit a printable surface. Preferred plastic materials include but are not limited to polypropylene including non-oriented polypropylene, uniaxially oriented polypropylene and biaxially oriented polypropylene, polyethylene terephthalate, polyester, polycarbonate, polystyrene or non-plasticized polyvinyl chloride. Especially preferred materials include polyesters and biaxially oriented polypropylene. The thickness of the plastic base sheets preferably is between 20 and 400 µm and more preferably between 30 and 150 µm. The plastic material and the thickness of the plastic base sheet are preferably selected so that the base sheet is flexible and stiff.

Also preferred as base sheets are laminates comprising, for example, a polymer layer applied to a paper sheet.

The base sheet 20 preferably exhibits essentially the same size as the bottom sheet of paper of the note-pad 1 but it is also possible that the sizes of the base sheet 20 and the bottom sheet of paper of the note-pad 1 are different. If the size of the base sheet exceeds the size of the bottom sheet of paper as is schematically shown in Fig. 4, the protruding parts of the sheet can be used for conveniently immobilizing the note-pad while taking a note, or such protruding parts can bear additional printing, for example, for advertisement purposes. It is also possible that the base sheet is smaller than the bottom sheet of paper of the note-pad and forms, for example, in case of a note-pad with an essentially rectangular-or square-geometry plurality of sheets of paper a strip along the edge of the bottom sheet of paper. If the size of the base sheet 20 is smaller than the size of the bottom sheet of paper, the geometry of the base sheet must be carefully selected in order not to adversely affect writing on the note-pad, in particular, when only few sheets of paper are left. The sizes and

geometrical extension of the base sheet 20 explicitly mentioned above are given by way of example only, and other sizes and geometrical extensions may be used as well.

The skid-resistant layer 25 comprises one or more compounds which are selected so that the skid-resistant layer 25 exhibits a static coefficient of friction of more than 1 as measured according to DIN 53 375-B on a stainless steel surface using a static frictional weight of 200 g. The method of measuring the coefficient of friction is referred to in the test section below.

If the static coefficient of friction is less than 1, lateral sliding of the note-pad 1 during writing is not sufficiently impeded. The static coefficient of friction preferably is at least 2 and more preferably at least 2.5.

It was further found by the present inventor that the skid-resistant layer needs to exhibit a peel adhesion on a stainless steel surface of less than 0.1 N/1.27 cm as measured according to FINAT Test Method no. 2 referred to in the test section below. If the peel adhesion on a stainless steel surface is higher than 0.1 N/1.27 cm, the note-pad tends to adhere, in particular, to smooth surfaces such as, for example, polished desk surfaces, which makes it impossible to easily slide the note-pad over the desk surface when no note is taken.

The skid-resistant layer of the note-pad of the present invention has a thickness of not more than 100 µm, preferably of less than 75 µm and especially preferably of less than 50 µm. While skid-resistant properties can be provided by using materials with a mechanically coarse surface ("sandpaper effect") or thick rubbery foam materials which are deformed upon the application of pressure and pressed into intimate contact with the respective substrate to provide skid resistance as is suggested, for example, in US 3,937,491, the skid-resistant layer of the note-pad of the present invention relies on the inherent skid resistance properties of the material used in such layer. It was recognized by the present inventor that in case of inherently skid-resistant materials, skid resistance is a surface property rather than a bulk property so that theoretically very thin skid-

resistant layers could be used. The upper limit of 100 μm required in the present invention was chosen in view of technical and economical, respectively, considerations in order to allow for convenient processing and for the mass-production of disposable note-pads. The thickness of the skid-resistant layer preferably is between 3 and 75 μm and more preferably between 5 and 50 μm.

The skid-resistant layers of the present invention are preferably smooth. Qualitatively, the term smooth means the absence of sharp or angular protrusions and/or indentations on the surface of the skid-resistant layer and also refers to the feel of the surface when touched, i. e., to the tactile characteristics of the coating. That is, the coating feels "smooth" to the touch. The term smooth skid-resistant layer includes, for example, essentially flat skid resistant layer but also skid-resistant layers comprising essentially non-sharp and/or non-angular protrusions such as essentially spherical protrusions or protrusions having the geometry of a truncated cone in an essentially regular and essentially dense array so that the appearance of the surface to the hand is essentially flat. The smooth surface of the skid-resistant layer 25 can be either matt or glossy in appearance but glossy surfaces are preferred.

Skid-resistant materials which fulfill the requirements of the skid-resistant layer of the note-pad according to the present invention, are known and can be selected, for example, from a group of polyolefin based polymeric materials. Suitable polyolefins include, for example, olefin homopolymers such as polypropylene and, in particular, atactic polypropylene, polyethylene and, in particular, low density polyethylene (LDPE) or linear low density polyethylene (LLDPE), or polybutene, homopolymers of substituted olefins such as, for example, polyvinyl acetate or polyethylene ethyl acetate, olefin-copolymers such as, for example, polyethylene vinyl acetate, ethylene-acrylate copolymers, ethylene methacrylate copolymers or copolymers of ethylene with other polar comonomers, and polyolefin plastomers such as ethylene/1-octene or ethylene/1butene copolymers which are obtainable by using the

metallocene catalyst system. The skid-resistant properties of polyolefin plastomers can be modified by incorporating additives such as fatty acid amides or inorganic materials such as silica as is described, for example, in J. Plastic Film Sheeting, 13 (1997), p. 142 - 149. The polyolefin based polymeric materials may comprise blends of the above polyolefins or blends of one or more of the above polyolefins with other polymers. The polyolefin based polymeric materials may optionally comprise additives such as, for example, one or more plasticizers such as naphtenic or aliphatic oil, solvents, stabilizing agents and antioxidants.

Skid-resistant materials which are useful in the present invention and fulfill the requirements of the skid-resistant layer of the note-pad pointed out above, can further be selected from a group of polymeric materials based on thermoplastic elastomer materials such as olefin-based elastomers like ethylene-propylene copolymers (EPM) or ethylene-propylene-diene terpolymers (EPDM). Another preferred class of thermoplastic elastomer materials comprises synthetic rubbers such as, for example, styrene-butadiene-copolymers and A-B-A triblock copolymers wherein A represents a crystalline styrene end block and B is an amorphous polybutadiene, polyethylene-butylene or polyisoprene center block. Other classes of preferred thermoplastic elastomers include, for example, non-curing polyurethane elastomers and polyester elastomers. The polymeric materials based on thermoplastic elastomer materials may comprise blends of the above thermoplastic elastomers or blends of one or more of the above thermoplastic elastomers with other polymers. Especially preferred are blends comprising at least one polyolefin and at least one thermoplastic polymer. Such blends or the polymer materials based on thermoplastic elastomer materials, respectively, may optionally comprise additives such as plasticizers, solvents, UV-stabilizers, antioxidants or fillers.

Especially preferred are also ethylene-vinyl acetate polymers such as the OREVAC™ materials available from Elf Atochem, Puteaux, France. The OREVAC series of materials are EVA terpolymers modified by the

adjunction of polar groups, which when molten, have excellent adhesive properties to various substrates.

The use of foam-type skid-resistant materials, such as, for example, those described in US 3,738,359 or EP 0,549,948 in the present invention is less preferred. US '359 discloses rubbery foams based on polymers of butadiene and styrene and polymers of butadiene, styrene and ethylenically unsaturated carboxylic acid for use in an instrument receiving pad which is capable of holding surgical instruments. These foams have a thickness of preferably between 40 and 150 mil corresponding to about 1 mm to about 3.8 mm and therefore do not meet the thickness requirements of the skid-resistant layer of the note-pad according to the present invention.

Using the foam-type materials of US '359 in a thinner thickness would result in open pore type materials which is less preferred because such materials accumulate dust and dirt in the open pores and often exhibit insufficient skid-resistant properties due to the small contact area between the foam and the underlying substrate.

EP '948 discloses foams comprising thermally expanded microbeads such as Expancel® or Foamcoat® which have a particle size before expansion in the range from about 5 to about 30 μm and typically expand upon heating by a factor of about 5 to 10 or more. Thermally expandable microbeads therefore tend to introduce protrusions which are large in comparison to the thickness of the skid-resistant layer in an irregular array and/or open pores into skid-resistant layers with a required thickness of less than 100 μm and are therefore less preferred.

The skid-resistant materials described above and methods of their preparation are known, and most of such materials are readily commercially available. Representative thermoplastic elastomer materials comprising block copolymers having crystalline styrene blocks and amorphous polyolefin blocks are available, for example, from Shell Chemical Co. under the trade designations Kraton D, Kraton G and Kraton RP. Preferred copolymers of olefins and polar comonomers are available

from Elf Atochem under the designation Lotryl (ethylene-acrylate copolymers) and Evatane (ethylene-vinyl acetate copolymers), respectively. Suitable polyolefin plastomers are commercially available from Dow Chemicals Co. under the designation Affinity. Specific examples of these commercially available materials are listed in the material section below.

The skid-resistant materials described above are especially suitable for preparing the note-pads according to the present invention, and they are preferred. The list of skid-resistant materials given above is, however, not meant to be limiting, and other skid-resistant materials which when applied as a skid-resistant layer to the base sheet of the note-pad, fulfill the requirements of a static coefficient of friction of at least 1 and a peel adhesion on stainless steel of less than 0.1 N/1.27 cm can be used as well. Useful skid-resistant materials are described, for example, in DE 44 32 298, EP 0,764,748 and US 4,086,388.

The person skilled in the art can easily qualitatively scan skid-resistant materials with respect to their usefulness in the present invention by applying them as a thin skid-resistant layer to a suitable base sheet such as a paper sheet and replacing the backsheet of a conventional Post-it® Notes note-pad (for example, product # 655 from 3M Company, size 76 mm x 127 mm), with the resulting sheet. The skid-resistant materials tested are usually suitable in the present invention

- if essentially no lateral movement of the modified note-pad when placed upon a polished stainless steel surface, is observed when taking a note, and
- if the modified note-pad when pressed with hand-pressure for 10 seconds against a stainless steel surface, can easily be slid across such surface when the pressure is removed.

This simple qualitative test usually allows to easily select skid-resistant materials which are suitable in the note-pads of the present invention. From such group of suitable skid-resistant materials those

materials are especially preferred which exhibit when applied as a skid-resistant layer

- a static coefficient of friction of less than 12, more preferably of 10 or less and especially preferably of 9 or less, and/or
- a T-peel adhesion against itself (i. e. against a second identical skid-resistant layer) of less than 1.0 N/1.27 cm.

It was found by the present inventor that note-pads of a conventional size of, for example, 76 mm x 127 mm, cannot be easily slid across the surfaces of, for example, a polished wooden desk if the static coefficient of friction of the skid-resistant layer is more than 10. For very small note-pads with a size of, for example, 38 mm x 51 mm, higher static coefficient of friction of up to 12 can be used although also in this case static coefficients of friction of 10 or less are preferred. Especially preferred are note-pads where the skid-resistant layer exhibits a static coefficient of friction of 9 or less.

It was also found by the present inventor that note-pads the skid-resistant layer of which having a high T-peel adhesion against itself, tend to block when placed with their respective skid-resistant layer against each other. This makes it difficult to separate the two note-pads from each other or even results in tearing or delamination, respectively, of one or both of the base sheets bearing the skid-resistant layer.

Skid-resistant materials having when applied as a skid-resistant layer a T-peel adhesion against themselves of less than 1.0 N/1.27 cm, more preferably of less than 0.5 N/1.27 cm and especially preferably of less than 0.1 N/1.27 cm are preferred.

It was found by the present inventor that skid-resistant layers comprising synthetic rubbers often exhibit high values of T-peel adhesion or tend to block against each other, respectively. Such rubber-based skid-resistant layers are less preferred. It is, however, usually possible to reduce T-peel adhesion by including, for example, one or more fillers such as silica or titanium dioxide into the skid-resistant layer whereby the average diameter of the fillers is preferably selected as not to introduce

sharp or angular deformations or protrusions into the surface of the skid-resistant layer. Suitable spherical silica fillers with an average diameter of from 7 - 40 nm are commercially available from Degussa, Hanau, under the trade designation "Aerosil".

The skid-resistant layer of the present invention preferably is transparent so that a printing on the bottom face of the base sheet can be read. Many of the skid-resistant materials which are suitable in the present invention are transparent and can be easily selected by the person skilled in the art. Especially preferred transparent materials include, for example, ethylene-based polymers such as ethylene-acrylate copolymers, ethylene-vinyl acetate copolymers and plastomers.

The skid-resistant layer can be applied to the base sheet or the bottom sheet of paper of the note-pad in case no base sheet is present, by coating a solution of the skid-resistant material onto the base sheet or the bottom sheet of paper, respectively, with subsequent evaporation of the solvent or by extruding the skid-resistant material onto such base sheet or bottom sheet or paper, respectively. Solvents which are suitable, in particular, for solvent coating of rubber-based skid-resistant materials, include toluene and heptane. Solventless extrusion is preferred.

If a plastic base sheet is used, co-extrusion of the skid-resistant layer and the base sheet is especially preferred. Anchorage of the skid-resistant layer to the co-extruded base sheet can often be improved by uniaxially or biaxially, respectively, stretching the co-extrudate.

The skid-resistant layer needs to be sufficiently anchored to the base sheet or the bottom sheet of paper, respectively, so that the skid-resistant layer is not delaminated, rubbed off or otherwise mechanically degraded when a note is taken or the note-pad is slid over the table when no pressure is applied. When solvent-coating or extruding a skid-resistant material onto paper base sheets, such material usually partly penetrates into the open pores at the paper surface resulting in a sufficiently stable anchorage. In case of paper base sheets with a low surface concentration of open pores, chemical primers can be used. In case of polymeric base

sheets priming of the surface bearing the skid-resistant layer with flame treatment or corona or plasma discharge treatment or chemical primers is often desirable. Chemical primers suitable for use in conjunction with polyolefin based polymeric materials include, for example, ethylene acrylic acid copolymer.

The OREVAC™ series of materials mentioned above have excellent adhesive properties to various substrates and provide a sufficiently strong anchoring on a wide variety of paper substrates without requiring the pre-treatment of the paper substrate by means of a chemical primer.

The skid-resistant layer can also be extruded as a separate film and applied to the base sheet by using an adhesive such as, for example, a permanent pressure-sensitive adhesive like acrylic adhesives disclosed, for example, in US RE 24,906 or synthetic rubber resin based adhesives.

The skid-resistant material can be applied so that the skid-resistant layer covers the base sheet or the bottom sheet of paper, respectively, fully or partly. In case of a partial skid-resistant layer, it can be applied, for example, in form of spots or stripes using, for example, conventional screen-printing or stripe-coating techniques. The ratio of the area of the skid-resistant layer over the area of the base sheet or the bottom sheet of paper, respectively, preferably is at least 0.2 and more preferably at least 0.3. Skid-resistant layers fully covering the base sheet or the bottom sheet of paper, respectively, are especially preferred.

It was found by the present inventor that the peel adhesion of a skid-resistant layer on a polished stainless steel surface and/or the T-peel adhesion to itself can often be reduced by including one or more fillers such as, for example, silica or titanium dioxide into the skid-resistant material. The fillers useful in the present invention are preferably selected so that their average diameter is less than 0.8, and more preferably, less than 0.5 and especially preferably less than 0.1 of the thickness of the skid-resistant layer in order not to introduce sharp or angular deformations or protrusions into the surface of the skid-resistant layer. The amount of one or more fillers with respect to the mass of the skid-resistant material

used for the skid-resistant layer preferably is between 0 to 15 wt. % and more preferably between 0 to 10 wt %.

The note-pads according to the present invention exhibit an advantageous skid resistance behaviour and low adhesion properties with respect to themselves (T-peel adhesion) and smooth surfaces such as, for example, polished wooden desktop surfaces or polished stainless steel surfaces. Because of the low thickness of the skid-resistant layer and the acceptable additional amount of costs introduced into the note-pads of the present invention as compared to conventional note-pads by providing a skid-resistant layer, the backsheet can be discarded when the sheets of paper 10, 11, 15 of the note-pad have been used up. The note-pads of the present invention are therefore particularly useful as disposable articles.

The present invention will be further illustrated by the following non-limiting examples. First, however, certain tests and procedures utilized in the examples will be described.

Test Methods

T-peel adhesion

Two base sheets having skid-resistant surfaces to be evaluated for T-peel adhesion having the dimensions of 10 cm wide by 15 cm long were placed against each other. The two sheets lying on top of each other were taped together at the ends with a paper-based masking tape, Tape # 202 from 3M Company. The taped assembly was then rolled over with a rubber-coated hand roller, applying firm pressure by hand, to eliminate air bubbles between the two skid-resistant surfaces.

The two-sheet assembly was then laid between two aluminum plates (ca. 12 cm wide and ca. 25 cm long having a thickness of 1 mm) and placed in a forced air oven at 50° C. Weights were placed on both ends of the aluminum plates. Each weight was 500 g.

The test set-up was allowed to remain in the heated oven for 3 days and then removed and allowed to cool. The weights and aluminum plates were then removed. The two-sheet assembly was placed in a controlled

environment for 30 minutes at 23° C and 50% relative humidity before evaluation.

Three strips having a width of 1.27 cm and a length of about 10 cm were cut from the laminate.

T-peel was measured according to ASTM D1876-61T. The two sheets of the laminate were separated for a distance of ca. 2 cm at one end and each of the two ends was placed, respectively, in a jaw of a tensile tester.

The jaws of the tensile tester were then moved apart at a rate of 300 mm/min. The force required to separate the laminate was recorded in N/1.27 cm. Two separate two-sheet assemblies were evaluated for each material and the results averaged.

90° Peel Adhesion

90° peel adhesion was measured using a tensile tester adapted in a special configuration to allow a peel angle of 90° to be maintained during the test. The equipment configuration is described in FINAT Test Method no. 2, a standard 90° peel test method (available from Federation Internationale des Fabricants Europeens et Transformateurs d'Adhesifs et Thermocollants sur Papiers et autres Supports (FINAT)).

There were several exceptions to the described FINAT method which are given below:

1) FINAT 2 requires a glass substrate which has been replaced by a stainless steel plate;
2) a "standard FINAT test roller" was replaced by a 6 kg roller;
3) the sample was rolled twice at 300 mm/min rather than twice at 200 mm/min as called for by the FINAT 2 method;
4) the dwell time was essentially zero rather than 20 min and 24 hrs, respectively, as required by the FINAT 2 method.

The backsheet comprising a base sheet bearing a skid-resistant layer to be evaluated for 90° peel adhesion was cut to a width of 1.27 cm. The backsheet was then rolled down onto a clean polished stainless steel plate

so that the skid-resistant layer faced the stainless steel plate, using a 6 kg roller at a speed of 300 mm/min.

The polished stainless steel test plate had been cleaned before using a tissue with methyl ethyl ketone, then with a 1:1 mixture of isopropyl alcohol and water and then again with methyl ethyl ketone and finally allowed to air dry.

The force required for removal of the backsheet from the polished stainless steel plate after a dwell time of 20 min. was measured using a tensile tester arranged in a configuration so that the peel angle from the substrate was maintained at 90° during the test.

Each base sheet was evaluated using three different samples and the results averaged. 90° peel adhesion results were recorded in N/1.27 cm.

Coefficient of Friction

Coefficient of friction was measured according to Deutsche Industrie Norm (DIN) 53 375-B.

Base sheets bearing a skid-resistant layer to be tested were adhered to the surface of a 7.5 cm x 23.5 cm aluminum test plate using a double-coated adhesive tape # 444 from 3M. The base sheet with the skid-resistant layer had the dimensions of 7.5 cm x 14.5 cm and was adhered to the aluminum test plate over its entire area with double-coated adhesive tape.

The frictional forces between the skid-resistant surface and a substrate surface were measured by pulling a sled the bottom face of which comprising a flat surface area of 40 cm^2 (6.3 cm on one side) of such substrate material over the exposed skid-resistant layer on the aluminum test plate. The total weight of the sled and 40 cm^2 test susbtrate was 200 g.

The substrate materials used on the bottom face of the sled were:

1) The non-adhesive side of Tape # 371 from 3M , a packaging tape comprising a biaxially-oriented polypropylene film backing bearing a urethane-based low adhesion backsize on one side and a rubber-resin

pressure-sensitive adhesive on the opposite side. A thin layer of polymeric foam (foam sheeting # 3449 from 3M) was placed between the tape and the sled bottom to ensure good surface contact as called for in DIN 53 375-B.

2) A stainless steel plate having an average surface roughness value R_a of 0.1 and an average peak to valley height value R_Z of 1.0. The roughness values R_a and R_Z were determined by a laser profilometer available from UBM Messtechnik GmbH, Ettlingen, Germany, model number UB-16. The roughness values were calculated by this machine in accordance with Deutsche Industrie Norm (DIN) 4768 and DIN 4762. The stainless steel plate was cleaned prior to each measurement using a tissue with methyl ethyl ketone, then with a 1.1 mixture of isopropyl alcohol and water, then again with methyl ethyl ketone and finally allowed to air dry.

The static and dynamic coefficients of friction were calculated from the frictional forces measured according to the following formulae:

a. Static coefficient of friction (μ_S)

$$\mu_S = F_S / F_\rho$$

b. Dynamic coefficient of friction (μ_D)

$$\mu_D = F_D / F_\rho$$

where

F_S = static frictional force

F_D = dynamic frictional force

F_ρ = the normal force (the force acting perpendicular to the surfaces in contact)

Measurements were made by mounting the sled into a commercially available tensile tester (Instron ™) and pulling it for a total distance of ca. 7.5 cm at a rate of 100 mm / min across the exposed skid-resistant surface. Test data were collected and coefficient of friction results were calculated using the software package testXpert ® Version 04.96 / T-01-00 (Copyright 1996) available from Zwick GmbH & Co in Ulm, Germany.

The data used for calculating both the static and the dynamic coefficient of friction were generated in one test. The test was run five times for each skid-resistant material using five different samples of the respective base sheet with the skid-resistant materials. The deviation in calculated coefficients of friction between different samples of the same material increases with the increase of the static coefficient of friction of the respective material. When repeating the measurement for a specific material five times or more, reliable data are obtained also for higher static coefficients of friction. A standard deviation of about ±1 for a static coefficient of friction of about 9 was typically obtained when using five measurements.

Materials employed in the Examples

Kraton D 1118X - linear SBS / SB, 31% polystyrene, 78% diblock, available as KRATON D 1118X from Shell Chemicals

Kraton G 1652 - hydrogenated linear S-EB-S, 30% polystyrene, available as KRATON G 1657 from Shell Chemicals

Kraton G 1657 - hydrogenated linear S-EB-S / S-EB polymer, 13% polystyrene, 30% diblock, available as KRATON G 1657 from Shell Chemicals

Kraton RP 6912 - S-EP-S-EP polymer, 21% styrene, available as KRATON RP 6912 from Shell Chemicals

KRATON D 1107 - linear S-I-S / S-I, 15% polystyrene, 17% diblock, available as KRATON D 1107 from Shell Chemicals

LOTRYL 30BA02 - a random copolymer of ethylene (70 %) and butyl acrylate (30 %) , melt index 1.5 - 2.5, mp 78°C, Vicat Softening point 45°C, available from Elf Atochem.

EVATANE 28-03 - a random copolymer of ethylene and vinyl acetate, ethylene (73%) vainyl acetate (27%), melt index (g/10 min) = 3 - 4.5, melting point = 75°C, Vicat softening point = 44°C, available from Elf Atochem

LOTRYL 18MA02 - a random copolymer of ethylene (80%) and methyl acrylate (20%), melt index 2-3 g/10 min, melting point 87°C, Vicat softening point 55°C, available from Elf Atochem .

AFFINITY PL 1880 - a polyolefin plastomer (POP) comprising a copolymer of ethylene and octene, density of 0.902, melt index (190°C / 2.16 kg) measured by ISO 1133 in g/ 10 min = 1.0, melting point 100°C by DSC, Vicat softening point 87°C, available as AFFINITY PL 1880 from Dow Plastics, a business unit of Dow Europe S.A.

AFFINITY VP 8770 - a polyolefin plastomer (POP) comprising a copolymer of ethylene and octene, density of 0.885, melt index (190°C / 2.16 kg) measured by ISO 1133 in g/ 10 min = 1.0, melting point 74°C by DSC, Vicat softening point 57°C, available as AFFINITY VP 8770 from Dow Plastics, a business unit of Dow Europe S.A.

AFFINITY EG 8150 - a polyolefin plastomer (POP) comprising a saturated ethylene octene copolymer, melt index (190°C / 2.16 kg) measured by ISO 1133 in g/ 10 min = 0.5, Mooney viscosity (ML 1+4/121°C) according to DIN 53523/T1 of 35, density of 0.868, available as AFFINITY EG 8150 from Dow Plastics, a business unit of Dow Europe S.A.

ENGAGE D 8829 (developmental product) - a polyoctene ethylene (POE) based compound, extended with napthenic oils, melt index in dg/min according to ASTM D1238(E) = 16, density = 0.89, Shore A hardness according to ASTM D2240 = 35, available as ENGAGE D 8829 from Dupont Dow.

FINA 3374X - film grade polypropylene homopolymer, density 0.905, melt flow (g/10 min) 2.5, melting point 163°C (available as FINA 3374X from Fina Oil and Chemical Company).

PRIMACOR 3003 - a copolymer of ethylene (93.5 %) and acrylic acid (6.5 %), melt index 7.8, Vicat softening point 85°, (available as PRIMACOR 3003 from Dow)

PU 5632 - clear polyurethane film bearing a layer of acrylic pressure-sensitive adhesive on one side (available as Product # 5632 from 3M)

AEROSIL 962 - hydrophobic fumed silica (available as AEROSIL 962 from Degussa).

Examples

Comparative Example 1

The paper backsheet was removed from a 100 count pad of removable self-stick Post-it® Notes (available as Product # 655 from 3M, size 76 mm x 127 mm), thus exposing the stripe of repositionable pressure-sensitive adhesive on the bottom face of the bottom sheet of paper in the pad. The note-pad was then placed on a polished wooden desktop. The note-pad lightly adhered to it, preventing the pad from moving during use.

After the pad had been moved and re-adhered to the desktop several times during the course of normal use, the exposed adhesive strip became contaminated with dust at which time it was unsightly and no longer adhered to the desk top nor provided any slip-resistant function. The bottom sheet of paper of the note-pad bearing the contaminated adhesive was then removed from the pad to expose a fresh adhesive surface of the underlying note.

90° peel adhesion, T-peel adhesion and static and dynamic coefficients of friction measurements were made using the adhesive-coated bottom face of a single repositionable sheet of paper of the note-pad freshly removed from the 100 count package of notes described above. Results are summarized in Table 2.

Comparative Example 2

A 100 count pad of removable self-stick Post-it® Notes (Product # 655 available from 3M Company, size 76 mm x 127 mm) bearing the original paper backsheet was placed on a polished wooden desktop and

written upon with one hand. The pad moved if not fixed with one hand and was difficult to write upon.

90° peel adhesion, T-peel adhesion and the static and dynamic coefficients of friction were measured as described above. Test results are summarized in Table 2.

Example 1

A 20 micron layer of hydrogenated styrene-butadiene-styrene triblock polymer (available as KRATON 1118 from Shell) was solvent-coated (20 % solids of Kraton 1118 in a 30 % / 70 % toluene/heptane solvent) onto a 36 μm thick sheet of corona-treated polyethylene terepthalate (PET) film. The solvent was then removed by drying in a forced-air oven.

The paper back sheet of a 100 count pad of Post-it® Notes (Product # 655, 76 mm x 127 mm) from 3M Company, was then removed and replaced with a sheet of the rubber-coated film just described, having the same dimensions as the original backsheet. The new backsheet comprising the PET base sheet and the rubber skid-resistant layer, was placed in combination with the stack of adhesive notes in such a manner that the adhesive stripe on the bottom face of the bottom sheet of paper of the pad contacted the non-coated side of the rubber-coated film backsheet and adhered to it. The rubber-coated side of the backsheet then formed the lowermost surface of the pad.

The pad of notes thus formed was placed on a desk having a wooden surface. The pad could easily be written upon with one hand without the user employing a second hand to hold the pad of notes in place. The pad could be used repeatedly in this manner and did not tend to accumulate dust and dirt on the rear surface.

The pad could easily be moved laterally over the desk top surface, but remained firmly in place when pressure was applied to the upper surface of the pad from above by a human hand using a writing instrument.

The physical properties of the paper sheet bearing the skid-resistant layer were evaluated according to the methods described under Test Methods as described above. The test results are summarized in Table 2.

The layer of synthetic rubber provided an effective skid-resistant behavior as demonstrated by the coefficient of friction measurements. A 90° peel adhesion from stainless steel of 0.01 N/1.27 cm was measured.

T-peel measurements showed that the layers of the KRATON 1118 tend to flow together or block. Attempts to separate the two-layers caused delamination of the test constructions (separation of the Kraton layer from the film carrier).

Examples 2-3

Example 1 was repeated with the exception that other KRATON™ block polymers were employed as a skid-resistant coating, respectively, on a film-based backsheet. Specifically, a hydrogenated S-EB-S polymer (available as KRATON G 1652 from Shell) and a hydrogenated S-EB-S / S-EB polymer (available as KRATON G 1657 from Shell) were coated onto the polyester film as in Example 1 and evaluated.

Backsheet constructions are summarized in Table 1 and test results are summarized in Table 2. The materials employed show good skid-resistant behaviour and low peel adhesion. T-peel measurements confirm a tendency of the rubber layer to bond irreversibly over time, when in contact with another rubber-coated backsheet from another pad of notes, for example.

Comparative Example 3

Example 1 was repeated with the exception that a styrene-isoprene-styrene triblock polymer available as KRATON D1107 was employed as a skid-resistant layer. The 90° peel adhesion was measured as 0.15 N/1.27 cm, indicating tackiness.

Examples 4-5

A two-layer film comprising a layer of ethylene/ butylacrylate (EBA) copolymer and a layer of ethylene / acrylic acid (EAA) copolymer was extruded onto paper. Two parallel single screw extruders (model ED45 from Plastikmaschinenbau and model EN30 from Extrudex) were used to feed a multi-layer die (Cloeren feedblock with an EDI-die) held at a temperature of ca. 310 °C. At line speed of about 12 m/min, the two-layer film was dropped at a distance of ca. 3 - 5 cm into a gap formed by a pressure roll and the paper substrate passing over a second chilled roll. The two-layer film was extruded directly onto the paper in such a manner that the EAA copolymer layer contacted the paper and functioned as a primer to promote adhesion of the skid-resistant layer to the paper. The EBA layer was exposed to form the skid-resistant layer.

The skid-resistant layer was a copolymer of ethylene (70 %) and butyl acrylate (30 %) , having a melt index of 1.5 - 2.5, mp 78°C, Vicat Softening point 45°C, available as LOTRYL 30BA02 from Elf Atochem.

The EAA primer was a random copolymer of 93.5 % ethylene and 6.5 % acrylic acid, melt index (190 °C/2.16 kg by ISO 1133) of 7.8, Vicat softening point of 85 °C, available as PRIMACOR 3003 from Dow.

Examples 4 and 5 had skid-resistant layers having a thickness of 25 microns and 15 microns, respectively. The EAA primer layer in Examples 4 and 5 had a thickness of ca. 10 microns.

Backsheet constructions are summarized in Table 1 and test results in Table 2. The skid-resistant layers employed in Examples 4 and 5 show good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Examples 6-7

A two-layer film comprising ethylene/ vinyl acetate (EVA) copolymer and an ethylene / acrylic acid (EAA) copolymer was extruded onto paper as is described in Examples 4 - 5 with the exception that the die temperature was 290 °C. The two-layer film was extruded onto the paper in

such a manner that the EAA copolymer layer contacted the paper and promoted adhesion between the paper and the EVA layer. The EVA layer was exposed to form the skid-resistant layer.

The EVA copolymer was a random copolymer of ethylene and vinyl acetate, ethylene (73%) vinyl acetate (27%), melt index (g/10 min) = 3 - 4.5, MP 75°C, Vicat softening point = 44°C, available as EVATANE 28-03 from Elf Atochem.

The EAA primer was a copolymer of 6.5 % acrylic acid in ethylene, available as PRIMACOR 3003 from Dow.

Base sheets of Examples 6 and 7 have 36 microns and 14 micron thick layers of EVA, and a ca. 10 micron layer of EAA primer as summarized in Table 1. Test results are shown in Table 2. The skid-resistant layers employed in Examples 6 and 7 show good skid resistance behaviour and virtually no adhesion properties.

Example 8

A two-layer film comprising a layer of ethylene/methyl acrylate copolymer and a polypropylene layer was co-extruded and then biaxially oriented (down web direction 5.5 X, cross web section 9X). The biaxially-oriented film had a total thickness of 55 microns. About 10 microns of the final thickness was a copolymer of ethylene (80%) and methyl acrylate (20%) (EMA), having a melt index 2-3 g/10 min, a melting point 87°C and a Vicat softening point 55°C; available as LOTRYL 18MA02 from Elf Atochem. About 45 microns of the final film thickness was polypropylene (available as FINA 3374X).

The two-layer film thus formed was employed as a backsheet for a pad of Post-it® Notes. The EMA layer was oriented away from the stack of notes and comprised the skid-resistant layer. The polypropylene layer was present to function as a carrier for the skid-resistant layer and to provide dimensional stability to the base sheet.

Backsheet constructions and test results are summarized in Tables 1 and 2, respectively. The skid-resistant layer employed in Example 8

showed good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Examples 9 and 10

Additonal examples of multilayer films as backsheets were prepared according to the method of Example 8. Layers of low density ethylene/ octene plastomer (polyolefin plastomers or POP) prepared industrially using metallocene-based catalysts were employed. Each polymer was co-extruded with a layer of polypropylene and then the resulting two-layer film was biaxially-oriented as in Example 8. The skid-resistant polymers utilized to form the skid-resistant layers in Examples 9 and 10, respectively, were:

1) a polyolefin plastomer, density of 0.902 (available as AFFINITY PL 1880 from Dow), and
2) a polyolefin plastomer, density of 0.885 (available as AFFINITY VP 8770 from Dow).

The two-layer films were then employed as backsheets for pads of Post-it® Notes in such a manner that the polypropylene carrier layer was in contact with the bottom of the lowermost note and the skid-resistant layer was exposed.

Backsheet constructions and test results are summarized in Tables 1 and 2, respectively. The skid-resistant layer employed in Examples 9 and 10 showed good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Example 11

Example 8 was repeated with the exception that a mixture of two polyolefin plastomers was employed to provide the skid-resistant layer of the extruded, biaxially-oriented two-layer backsheet. The composition of the skid-resistant layer was 75 % by weight of a first polyolefin plastomer, density of 0.902 (available as AFFINITY PL 1880 from Dow) and 25 % by weight of a second polyolefin plastomer, density of 0.868 (available as AFFINITY EG 8150 from Dow).

Backsheet construction and test results are summarized in Table 1 and 2, respectively. The skid-resistant layer employed in Example 11 showed good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Example 12

Example 8 was repeated with the exception that a mixture of two polymers was employed to provide the skid-resistant layer of the extruded, biaxially-oriented two-layer backsheet. The composition of the skid-resistant layer was 50% by weight polypropylene (available as FINA 3374X from Fina Oil and Chemical Company) and 50% by weight of a polyolefin plastomer, density of 0.868 (available as AFFINITY EG 8150 from Dow). The polymer mixture was coextruded with polypropylene as a carrier as in Example 8.

Backsheet construction and test results are summarized in Table 1 and 2, respectively. The skid-resistant layer employed in Example 12 showed good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Example 13

A 36 micron thick film of corona-treated polyethylene terephthalate (PET) was coated by extruding a single 47 micron thick layer of an octene/ethylene polymer (POE) compounded with napthenic oil (available as ENGAGE D 8829 from Dupont Dow). The two-layer backsheet was employed in a pad of Post-it® Notes, the layer of ENGAGE D 8829 functioning as the exposed skid-resistant layer.

Backsheet construction and test results are summarized in Tables 1 and 2, respectively. The skid-resistant layer employed in Example 13 showed good skid resistance behaviour and a low 90° peel adhesion and T-peel adhesion.

Comparative Example 4

A sheet of clear polyurethane film bearing a layer of acrylic pressure-sensitive adhesive on one side (available as 3M product # 5632) was adhered to the exposed side of the paper backsheet of a pad of Post-it® Notes (available as Product # 655 from 3M Company).

The polyurethane layer which functioned as a skid-resistant layer, had a thickness of 860 μm.

Examples 14 - 16

Example 14 - 16 demonstrate that KRATON RP 6912 (S-EP-S-EP polymer, 21 % styrene, available as KRATON RP 6912 from Shell Chemicals) can be used to provide a skid-resistant layer in a note-pad backing. The addition of hydrophobic fumed silica (available as AEROSIL 972 from Degussa, average particle size of primary particles 16 nm, inner surface BET area 110 ± 20 m^2/g) in amounts of 2 parts per 100 parts rubber and 10 parts per 100 parts rubber by weight, respectively (Examples 15 - 16) reduce the tendency of the KRATON RP 6912 layer to block to itself with an accompanying reduction in coefficient of friction.

Base sheet constructions and test results are summarized in Table 1 and 2, respectively.

Example 17

A 99 microns thick layer of a modified ethylene vinylacetate copolyer, available from Elf Atochem, Puteaux, France, as OREVAC™ 18211, was extruded directly onto a 70 g/m^2, 83 micron thick paper. The OREVAC series of materials are EVA copolymers modified by the adjunction of polar groups, which when molten, have excellent adhesive properties to various substrates.

The polymer was anchored well to the paper in the absence of primer or special coatings to improve adhesion between the two layers. Attempts to remove the polymeric coating by peeling it from the paper

sheet resulted in delamination and removal of fibers from the surface of the paper.

Backsheet constructions are summarized in Table 1 and test results are summarized in Table 2. The materials employed showed good skid-resistance and low peel adhesion and no blocking.

Table 1

Example	Backsheet			
	Skid-resistant layer		Base sheet	
	Material	Thickness, microns	Material	Thickness, microns
C1	Repositionable PSA	4	Paper	83
C2	None	0	Paper	83
1	KRATON D 1118	20	Polyester (PET)	36
2	KRATON G 1652	21	Polyester (PET)	36
3	KRATON G 1657	19	Polyester (PET)	36
C3	CARIFLEX 1107	25	Polyester (PET)	36
4	LOTRYL 30BA02	25	Paper	83
5	LOTRYL 30BA02	15	Paper	83
6	EVATANE 28-03	34	Paper	83
7	EVATANE 28-03	16	Paper	83
8	LOTRYL 18MA02	10	Polpropylene film	36
9	AFFINITY PL 1880	12	Polpropylene film	36
10	AFFINITY VP 8770	9	Polpropylene film	38
11	AFFINITY PL 1880 / AFFINITY EG 8150 75:25 w:w	9	Polpropylene film	34
12	AFFINITY EG 8150 / PP 50:50 w:w	6	Polpropylene film	25
13	ENGAGE D 8829	47	Polyethylene terphthalate film	36
C4	Polyurethane	860	Paper	83
14	KRATON 6912	10	Polyester (PET)	36
15	KRATON 6912 / 2% fumed silica	16	Polyester (PET)	36
16	KRATON 6912 / 10% fumed silica	25	Polyester (PET)	36
17	OREVAC 18211	99	Paper	83

Table 2

Example	90° Peel	T-Peel, 3d, 50°C	Coefficient of friction			
	N/1.27 cm	N/1.27cm	Static (Film)	Dynamic (Film)	Static (Stainless Steel)	Dynamic (Stainless Steel)
C1	0.52	0.85	4.4	4.1	2.3	1.3
C2	0	0	0.3	0.6	0.4	0.4
1	0.01	Blocked	7.5	5.2	--	--
2	0.03	Blocked	9.1	*	9.4	*
3	0.03	Blocked	12.0	*	--	--
C3	0.15	Blocked	14.7	*	4.9	1.9
4	0	< 0.01	5.5	--	2.1	1.9
5	0	< 0.01	4.3	--	--	--
6	0	< 0.01	6.6	--	3.0	*
7	0	< 0.01	6.3	--	--	--
8	0	< 0.01	4.1	*	--	--
9	< 0.01	0.03	6.2	*	--	--
10	< 0.01	0.51	4.5	*	4.5	*
11	< 0.01	0.36	3.8	*	3.7	*
12		0.36	2.5	1.24	--	--
13	< 0.01	0.07	2.3	2.2	1.8	1.9
C4	< 0.01	< 0.01	11.4	*	11.7	*
14	0.05	Blocked	10.3	*	--	--
15	0.08	Blocked	7.6	*	--	--
16	0	0.02	1.1	1.4	1.0	0.9
17	< 0.10	< 0.10	7.02	*	3.62	*

* Not measurable

-- Not measured, data not available